

AMENDMENTS TO THE CLAIMS

Listing of the claims:

Following is a listing of all claims in the present application, which listing supersedes all previously presented claims:

1. (Currently Amended) An information processing apparatus provided with an input system utilizing a stroboscope, comprising:

a stroboscope including a light source outputting a light of a specific wavelength range;

a base unit which includes a supporting cylinder having an opening and a lens provided below said opening in said supporting cylinder;

a filter provided so as to cover said opening of said supporting cylinder and passing only the light of said specific wavelength range;

a first object including a first retroreflective body; said light source being provided in the vicinity of said filter so as to light up said first object;

an imager, which is provided within said base unit and below said lens, imaging means for imaging [[an]] said first object at a light-emission and at a non-light-emission of said stroboscope to ~~output~~ produce [[an]] a plurality of image signals ~~signal~~ at light-emission and [[an]] a plurality of image signals at non-light emission;

~~a first means for~~ calculator calculating a part or all of information of a position, a size, a velocity, an acceleration, a moving path pattern of said first object by detecting a first notable portion in correspondence to said first retroreflective body from ~~on the basis of~~ a difference between a plurality of said image signals at light-emission and a plurality of said image signals at non-light emission; and

~~a second means for an information processor~~ performing information processing according to an application on the basis of the information calculated based on said difference by said ~~first means for~~ calculator to provide an output according to said application, ~~wherein~~

~~said object to be imaged by said imaging means includes a retroreflective body.~~

2. (Currently Amended) An information processing apparatus according to claim [[1]] 19, wherein said ~~first means~~ calculator includes a ~~determination means for~~ determiner determining whether or not said information based on said difference is coincident with a predetermined condition, and

said moving object controller gives a change on said moving object in said screen if said determiner determines that said information based on said difference satisfies said predetermined condition.

3. (Currently Amended) An information processing apparatus according to claim [[2]] 1, wherein said calculator includes a determiner determining whether or not said information based on said difference is coincident with a predetermined condition, and ~~said first means~~ further includes a valid input transmitter transmitting ~~detecting means~~ for detecting ~~only a valid information out of said information~~ based on said difference on the basis of the ~~determination result by said determination means, and transmitting to~~ said processor ~~second means~~ as the valid information being performed only if said determiner determines that said information based on said difference satisfies said predetermined condition.

4. (Currently Amended) An information processing apparatus according to claim 1, wherein said ~~first means~~ calculator includes a distance ~~calculating means for~~ calculator extracting said first notable portion from said difference and calculating a distance between said first object and said ~~imaging means~~ imager from the information indicative of a size of said ~~object~~ first notable portion.

5. (Currently Amended) An information processing apparatus according to claim 1, wherein said ~~first means~~ calculator includes an extractor extracting a shape of said first notable portion ~~analyzing means for analyzing information obtained from said a~~ difference between said image signal at light-emission and said image signal at non-light emission to ~~extract a shape of said object, and~~

a first angle calculating means for calculator calculating a first an angle between said ~~object and said imaging means from~~ indicative of an inclination of said shape corresponding to said first object.

6. (Currently Amended) An information processing apparatus according to claim 5, wherein ~~the analysis by said analyzing means is for extracting~~ extractor extracts predetermined two points within said ~~object~~ first notable portion, and the calculation of the first angle by said first angle ~~calculating means~~ calculator is for calculating an angle between a line segment between the predetermined two points and a predetermined coordinate axis.

7. (Original) An information processing apparatus according to claim 1, wherein a time interval of the light-emission of said stroboscope is freely settable.

8. (Original) An information processing apparatus according to claim 1, wherein a length of the light-emission and a length of the non-light-emission of said stroboscope are freely configurable.

9. (Original) An information processing apparatus according to claim 1, wherein an exposure period of said imaging means is freely configurable.

10. (Canceled)

11. (Canceled)

12. (Canceled)

13. (Currently Amended) An information processing apparatus according to claim [[11]] 1, wherein said ~~imaging means~~ imager includes an imaging device for imaging only ~~the image formed by~~ said light having the a specific wavelength range.

14. (Currently Amended) An information processing apparatus according to claim 1, wherein each of said calculation of said first means calculator and said information processing of ~~said second means for~~ information processor ~~are is a process to be~~

processed by a single or a plurality of processors.

15. (Currently Amended) An information processing apparatus according to claim 1, wherein the information processing performed by said ~~second means for~~ information processor is an entertainment processing such as a game, etc.

16. (Previously Presented) A man-machine interface comprising an information processing apparatus provided with an input system utilizing a stroboscope, as recited in claim 1.

17. (Canceled)

18. (Currently Amended) A storage medium storing a program for by which a processor of an information processing apparatus provided with an input system utilizing a stroboscope which includes a light source outputting a light of a specific wavelength range;

a base unit which includes a supporting cylinder having an opening and a lens provided below said opening in said supporting cylinder; a filter provided so as to cover said opening of said supporting cylinder and passing only the light of said specific wavelength range; a first object including a first retroreflective body, wherein the light source is provided in the vicinity of said filter so as to light up said first object; and an imager which images the light passing through said filter, executes the said program causing a processor of said information processing apparatus to execute steps of:

an imaging step ~~for~~ of imaging by said imager an said first object at a light-emission and at a non-light-emission of said stroboscope to ~~output~~ produce an a plurality of image signals at light-emission and an a plurality of image signals signal at non-light emission;

a first step ~~for~~ of calculating a part or all of information of a position, a size, a velocity, an acceleration, a moving path pattern of said first object by detecting a first notable portion in correspondence to said first retroreflective body from ~~on the basis of a difference between a plurality of said image signal at light-emission and a plurality of said image signal at non-light emission; and~~

a second step ~~for~~ of performing information processing according to an application on the basis of the information calculated based on said difference by said first step to provide an output according to said application.

19. (New) An information processing apparatus according to claim 1, wherein said information processor includes a moving object controller controlling a movement of a moving object displayed on a screen based on said information calculated based on said difference by said calculator.

20. (New) An information processing apparatus according to claim 1, further comprising a movable body rotatable in at least one of an elevation direction and a revolution direction, said imager, base unit and light source being accommodated in said movable body.

21. (New) An information processing apparatus according to claim 1, wherein said first retroreflective body is provided in a transparent or semitransparent housing.

22. (New) An information processing apparatus according to claim 1, wherein said first object is provided with a strap.

23. (New) An information processing apparatus according to claim 1, wherein said first object is attached to a lower leg or an ankle of a player.

24. (New) An information processing apparatus according to claim 1, wherein said first object is in a form of a band.

25. (New) An information processing apparatus according to claim 1, wherein said first object is in a form of a glove.

26. (New) An information processing apparatus according to claim 1, wherein said first retroreflective body has a long-thin shape, and

said calculator detects said first notable portion from said difference-and calculates at least one of an angle, position, moving speed and moving path pattern of said first object, and

said information processor performs a sword battle game on the basis of said at least one of the angle, position, moving speed and moving path pattern of said first object calculated by said calculator.

27. (New) An information processing apparatus according to claim 1, further comprising a second object including a second retroreflective body, wherein

said imager images said second object at a light-emission and at a non-light-emission of said stroboscope to produce a plurality of image signals at light-emission and a plurality of image signals at non-light emission;

said calculator calculates a part or all of information of a position, a size, a velocity, an acceleration, a moving path pattern of said second object by detecting a second notable portion in correspondence to said second retroreflective body from difference between said image signal at light-emission and said image signal at non-light emission; and

said information processor performs information processing according to an application on the basis of the information of the first object and the second object calculated based on said difference by said calculator to provide an output according to said application.

28. (New) An information processing apparatus according to claim 27, wherein said first object is attached to a hand or wrist, or held by a hand of a player, and said second object is attached to a lower leg or ankle of said player.

29. (New) An information processing apparatus according to claim 19, wherein said moving object controller controls a movement of said moving object of said screen on the basis of the position of said first object calculated by said calculator.

30. (New) An information processing apparatus according to claim 19, wherein said moving object controller calculates an initial speed of said moving object on said screen on the basis of the speed of said first object calculated by said calculator.

31. (New) An information processing apparatus according to claim 19, wherein said information processor includes a determiner determining whether said moving object on said screen collides with a predetermined image on said screen.

32. (New) An information processing apparatus according to claim 2, wherein said determiner determines whether said first object was swung on the basis of the speed of said first object.

33. (New) An information processing apparatus according to claim 33, wherein said determiner determines that said first object was swung when the speed of said first object becomes equal to or larger a predetermined value in a plurality of succeeding times.

34. (New) An information processing apparatus according to claim 32, wherein said moving object controller calculates an initial speed of said moving object on said screen on the basis of the speed of said first object calculated by said calculator if and when said determiner determines that said first object was swung.

35. (New) An information processing apparatus according to claim 31, wherein said moving object on said screen is an image of a ball for a bowling game and said predetermined image on said screen is an image of a pin for the bowling game.
36. (New) An information processing apparatus according to claim 23, wherein said application is for a soccer game.
37. (New) An information processing apparatus according to claim 28, wherein said application is for a dance game.
38. (New) An information processing apparatus according to claim 1, wherein said application is for any one of a bowling game, baseball game, table tennis game, tennis game, soccer game, boxing game, dance game and sword battle game.
39. (New) An information processing apparatus according to claim 34, wherein said moving object on said screen is an image of a ball for golf game.
40. New) An information processing apparatus according to claim 5, wherein said calculator includes a swing direction calculator calculating a swing direction of said first object on the basis of a movement of said first notable portion, and a second angle calculator calculating a second angle indicative of an inclination of said first object with respect to said swing direction on the basis of said swing direction calculated by said swing direction calculator and said first angle calculated by said first angle calculator.

41. (New) An information processing apparatus according to claim 40, wherein said information processor includes a parameter calculator calculating a parameter of a hook/slice in hitting a ball on the basis of said second angle.